Method and apparatus for milk selection with milking machines

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The method of selection of milk in a milking parlour has the milk flow in a measuring chamber (3) measured by a detector (6). Part of the milk in the chamber is decanted and the area of the floor (25) surface of the chamber is monitored. A monitor value is produced and independence of the values the milk flow to the collecting container is allowed or not. Claims include a machine for carrying out the method.

Result Page

[0001] The item of the invention refers to a method as well as to an apparatus for the selection of milk with the machine-operated milking.

[0002] Raw milk is an important food and an important raw material for food industry. For the protection of the consumer and to the technical processing ability raw milk must meet both national and international quality requirements.

[0003] Raw milk may not exhibit abnormal sensory features after §& 3 of the milk regulation (Federal Republic of Germany), so that in accordance with plant 3 of the milk regulation persons, who milk, who have first milk jets from each teat separately to milk and by testing of their appearance of the perfect nature of the milk from each animal to convince themselves. The first milk jets may not be brought to the milk regulation in accordance with §& 18 into traffic.

[0004] Animals, of which milk is won as food, may not suffer after plant 1 of the milk regulation from a recognizable inflammation of the Euters. Appropriate legislation (RL92/46 EEC, appendix A and RL89/362 EEC, appendix chapter III) comes likewise within the European union to the application.

[0005] Signs of a recognizable inflammation of the Euters (clinical Mastitis) are among other things the presence of flocks, consisting of fabric remainders, fibrin, cell interpreting rite, Blutkoagula and Mastitiserregern in the Gemelk of individual gland complexes, Euterviertel and/or. Euterhälften and in the Gesamtgemelk of individual animals.

[0006] Macroscopically recognizable flocks know a size of approx. 100 mu m up to several millimeters exhibit. Das Ansammeln solcher Flocken in bestimmten Gemelksfraktionen, vorzugsweise den Vor- und Anfangsgemelken, kann zu einem hochviskösen Sekret von mehreren Millilitern führen. Such flocs are quality-determining particles, which determine and if necessary exclude the negotiability of raw milk.

[0007] Pre and Anfangsgemelke can contain particles, which are not sign of a recognizable inflammation of the Euters beside flocs also, but when foreign particles come from the environment. Such particles can arrive by insufficient cleaning measures at the Euter of the animal into the milk. Here it can concern for example hair, dust, straw particle, sawdust and hay remainders.

[0008] In the practice the differentiation between quality-determining particles and foreign particles is by testing of their appearance without considerable difficulties possible, there itself the particles among other things with respect to colour, mould, value, structure and pattern mostly substantially from each other differentiate.

[0009] With conventional milking technology the short milk hoses usually flow in a piece of milk collection, of where from the milk in a long milk hose is led the Milchleitung and finally in a milk collection tank caught, cooled and stored. The milk is then processed in appropriate specialized enterprises.

[0010] With automatic milking procedures regularly the short milk hoses and a piece of milk collection are missing, so that the milk of each functional milk gland is supplied separately in a milk hose of the Milchleitung and finally caught, cooled and stored in a milk collection tank.

[0011] Gemelke of several, parallel milked animals mix themselves in the Milchleitung. Into the milk collection tank all Gemelke of the animals of a herd arrives, so that the caught milk becomes designated as herd collecting milk.

▲ top [0012] The milk of animals with recognizable Euterentzündung is to be ermelken separately, whereby usually in conventional milking technology the long milk hose before inlet into the Milchleitung a collection container (so-called. ?Can? is inserted), which the sense-due changed milk is supplied. The Gemelk is afterwards rejected.

[0013] As decision basis a preceding testing of the appearance serves separated won Vorgemelks by the Melker.

[0014] In practice however the danger exists that the visual sense maturity examination will often omit, since it is generally secondarycomplex and thus uneconomic. Mechanisms, which make the collection possible of flocs, are to be controlled by the Melker, what is likewise connected with a not insignificant expenditure of time.

[0015] With automatic milking procedures the testing of the appearance is separate won Vorgemelks by the Melker not possible. Those so far admits become technical apparatuses works insufficiently, so that it cannot be ensured that the milk won with the automatic milking corresponds to the national and international quality regulations.

[0016] By US 4.376.053 a method and an apparatus are well-known to the determination of particles in the milk. The apparatus exhibits a filter unit, which has a filter housing with an outward open gap. The filter housing is a filter element arranged that in the suitable framework kept becomes basic from a sealing member. For examination, whether in the Gemelk particles were contained it is taken out, the filter element of the filter housing and submitted of an optical testing. In order that the Milchleitung is not blocked by a clogged filter element and lead the vacuum at the milking witnesses not is lost, to a waste the milking witness can to guarantee what, is parallel to the flow path a bypass passage intended.

[0017] An advancement of the filter unit described by US 4.376.053 is by the WHERE 00/67559 well-known. After this document an apparatus is suggested for automatic milk segregation with the machine-operated milking. The device points a measuring device to to controlling of the won milk, a valve mechanism with a milk course and several milk exits as well as a catch mechanism for the optional shut-off position of the milk exits and for optional leading of the milk stream in one of several routings. The valve mechanism becomes actuated by control means. The testing takes place via a detection by means of a particle detecting mechanism. In the flow path of the milk a filter element is arranged, which is detected by the particle detector mechanism.

[0018] The determination of the flocs and/or. Particle must take place animal-individually. This presupposes that a cleaning of the Filterelementes can take place reliably and surely, without a contamination of following milk stream with particles of preceding Gemelke

takes place. The cleaning of the Filterelementes with by the WHERE 00/67559 well-known the apparatus takes place via the fact that the particles lying on the filter element are replaced by rotation of the Filterelementes with the help of the milk stream. Alternatively for this the cleaning of the Filterelementes can take place via a ?way Splash?. Here the danger exists that from the milk stream following particle can to settle on the rear side of the Filterelementes and lead thus to incorrect measuring. There is also the danger that particle-free milk stream with quality-reducing particles of previous milking are contaminated.

[0019] By the WHERE 99/31966 is a method and an apparatus for separating milk well-known. After this method a first part of the ermolkenen milk from the milk stream is separated and rejected. Afterwards a milk sample becomes from the milk stream pulled and afterwards analyzed. In dependence of the result of the analysis it is decided whether the milk stream is led or rejected into the milk collection tank for usable milk.

[0020] Da nach dem Vorschlag der WO 99/31966 erst eine zweite Gemelksfraktion einer Analyse unterzogen wird, besteht die Gefahr, dass die diagnostische Sicherheit einer Sinnfälligkeitsprüfung erheblich sinkt.

[0021] Hiervon ausgehend liegt der vorliegenden Erfindung die Zielsetzung zugrunde, ein Verfahren und eine Vorrichtung anzugeben, durch die mit einfachen Mitteln die diagnostische Sicherheit einer Sinnfälligkeitsprüfung erhöht werden kann. A further goal of the invention is it to guarantee that a contamination of following Gemelke is avoided by particles from preceding Gemelken.

[0022] This object becomes according to invention by a method with the features of the claim 1 and/or. by an apparatus with the features of the claim 26 detached. Favourable training further and embodiments of the method and/or. the device are item that dependent claims in each case.

[0023] After a thought according to invention a method is suggested for the selection by milk, with which a milk volume of a milk stream is led into a measurement chamber with at least a detector unit. Die flüssige (wässrige) Phase der sich in der Messkammer befindenden Milch wird aus der Messkammer geleitet. For example flocs are and/or in the first parliamentary group of a milk stream. Particles contained, remain these in the measurement chamber. If the entire aqueous phase of the milk is derived from the measuring chamber, then the flocs collect themselves and/or. the particles in the bottom portion of the measurement chamber on. After at least a part of the liquid phase of the milk which is in the measurement chamber was derived from the measurement chamber, a detection takes place at least an area of the bottom surface of the measurement chamber. Preferably the entire bottom surface of the measurement chamber is detected, whereby a more founded statement over the particle and/or. the flake content in the milk to be met knows. In dependence of the result of the evaluation of the detection the milk stream is led or rejected either to the collection container for usable milk.

[0024] According to invention a higher diagnostic security is reached by this procedure guidance. In particular by this procedure guidance it is also reached that the particles which are in the milk volume and/or. Flocks no or only a very small change skilled, so that the particles remained in the measurement chamber and/or. Milk flakes their original value and/or. Mould maintain, whereby a statement over those actually itself in the milk volume finding floccules and/or. Particle to be met can.

[0025] Um die Abtrennung der Flocken bzw. Particle from the liquid phase in the measuring chamber will accelerate to simplify and in accordance with a favourable further training of the method suggested that the milk volume also for the liquid phase permeable and/or. in contact one brings to constant support means. Preferably it concerns with the means macro and/or microstructures between those at least a part of the liquid phase to lead itself can. The macro and/or microstructures can be different form. Preferably the macro and/or microstructures are cylindric trained. There is also the possibility that the macro structures are overlaid by the microstructures. Furthermore it exists the possibility that the support means exhibit areas, in which however macro structures and areas, in which only microstructures are intended.

[0026] After a further favourable embodiment of the method it is suggested that the liquid phase is derived within a given time interval from the measurement chamber.

[0027] In accordance with a further inventive thought it is suggested that a milk volume of a milk stream in a measurement chamber with at least a detector unit is led. It takes place a decanting of the milk which is in the measurement chamber, so that the liquid phase of the milk parliamentary group led into the measurement chamber is derived. After the decanting a detection takes place at least an area of the bottom surface of the measurement chamber.

[0028] In order to avoid that the derivative of the liquid phase and/or the detection are affected by a following milk stream, it plans a further favourable further training of the method that the milk stream, after introduction of the milk volume into the measurement chamber, is led past this.

[0029] In particular it is suggested that the milk stream is at least partly led past in a bypass line the measurement chamber.

[0030] The measurement chamber exhibits preferably at least one filling condition sensor, which is connected with a control unit. It is examined by the filling condition sensor whether in the measurement chamber a given milk volume is. If the given milk volume was reached, then the milk current supply is interrupted and preferably led past the chamber. Instead of a filling condition sensor for the verification of the given milk volume also a determination of the milk volume can take place on the basis measuring data, in particular the velocity of flow of the milk.

[0031] After a further favourable formation of the method it is suggested that the milk stream is led into a Milchleitung. The measuring chamber is connected by a feed line with the Milchleitung, whereby the feed line exhibits a valve unit, by which the flowtechnical connection between the Milchleitung and the measurement chamber is interrupted.

[0032] It is guaranteed by this measure that the milk volume which is in the measuring chamber is not affected by the following milk stream, so that a relatively quick calming of the milk volume which is in the measuring chamber is reached, whereby the particles finding in the milk volume can set off rapidly at the floor of the measurement chamber.

[0033] The milking procedure as such is a continuous event and can therefore not for the durations of the measuring be interrupted. Around the milk losses if possible small it will keep suggested that the milk stream is led into a buffer. After evaluation of the detection in dependence by the evaluation result the milk from the buffer is led either into a wire for usable milk or into a wire for non-usable milk. In dependence of the length of time, in which the liquid phase is derived from the measurement chamber and/or the detection is accomplished, the milk stream that can at least during the detection of the Milchleitung flows, to be rejected for the avoidance of a higher machine expenditure.

[0034] After a still further favourable further training of the method it is suggested that the milk stream before the measurement chamber in a calming distance is calmed down. It is reached by this measure that a settling of the particles in the measurement chamber, which are in the milk stream, is accelerated.

[0035] When deriving the milk which is in the measurement chamber, this is preferably led over an edge of an outlet. For this it is suggested that the spacing and/or the ply between the floor of the measurement chamber and an edge of an outlet are relatively to each

'other changeable and/or. are. Here the possibility exists that the floor of the measurement chamber stationarily, while the edge is situation-variable. The change of position of the edge takes place via suitable means, which are connected with a control unit. By the control unit the spacing and/or the ply between a floor of the measurement chamber and an edge of the outlet can become controlled relatively to each other. The change of the distance and the ply can take place continuous or discontinuous. Here the deriving procedure can be accomplished, in particular the decantation procedure in dependence by the calming degree of the milk volume in the measurement chamber differently quick. Is favourable, if at the beginning of the event the velocity of flow of the milk from the measurement chamber is relatively large and this decreases to the end of the event.

[0036] After a still further favourable embodiment of the method according to invention it is suggested that after the detection and preferably after an emptying of the measurement chamber a cleaning procedure of the measurement chamber takes place. Thereby it is to be guaranteed that a contamination of following milk stream does not take place.

[0037] A cleaning procedure is preferential, with which at least a cleaning agent is led by the measurement chamber. Während des Reinigungsvorgangs ist wenigstens die Messkammer gegenüber dem Milchstrom abgeschlossen. Because the measuring chamber is final in relation to the milk stream is guaranteed, that a cleaning agent, which is passed through the measuring device can penetrate wires not into milk-prominent components, in particular. By the cleaning agent the flocs deposited at the bottom of the chamber become and/or. Particle detached and from the measurement chamber out-carried.

[0038] After a still further favourable embodiment it is suggested that after that at least cleaning agent air is passed through the measurement chamber. Here air is led by means of a blower mechanism, which is released by a filter from dust particles, into the measuring device, in order to release the elements of the measuring device coming with liquids into contact from liquid arrears, in particular from cleaning agent arrears. Here a procedure guidance, with which air is warmed up before in the blower mechanism, is preferred in particular on a temperature of at the most 45 DEG C. Higher temperatures are possible, it exist however the danger the fact that the physicochemical properties of milk remainders change in such a way that this durably to elements coming with fluids into contact remains.

[0039] The cleaning takes place preferably in such a manner that a cleaning agent the measurement chamber opposite to the direction of flow of the liquid phase and/or. the milk stream flows through. Thereby the deposited flocs become and/or. Particle detached and from the measurement chamber out-carried.

[0040] Preferably the measurement chamber is locked by means of valve mechanisms, which become controlled by a control unit, by the Milchleitung, whereby the valve mechanisms remain during the cleaning procedure closed.

[0041] It is suggested the moreover that the time interval, which is necessary for the detection, as briefly as technically possible kept will and thus as possible as small a milk quantities during the detection is rejected. For this will milk river recognition suggested, so that one time interval, within which a portion of a milk stream is led into a measuring chamber, can be determined also in dependence by the volume flow of the milk stream. Milk river recognition can be consulted also for the activation of the method. Milk river recognition preferably takes place by means of a milk river sensor, which is arranged before the measurement chamber in particular. Furthermore it exists also the possibility of positioning the milk river sensor into the measuring chamber inlet of the measurement chamber or the expiration of measuring chamber.

[0042] Preferably a response can take place on the signal which is received from the milk river sensor around one and/or adjustable time interval which can be defined time-delayed, with the fact is ensured that a sufficient quantity of the Vorgemelks becomes introduced into the measuring chamber.

[0043] In accordance with a still further favourable carrying out the method it is suggested that the cleaning success of the measurement chamber is examined by detection and in dependence by the evaluation result the cleaning be repeated can. It was stated that the cleaning was incomplete, then the cleaning procedure is repeated until desired cleaning success occurs. The time interval available for it is limited by the milking duration of the animal and the time, until a following animal is milked.

[0044] After a still further favourable embodiment of the method it is suggested that the detection takes place optically, in particular with technical mechanisms and picture-giving methods. Preferably process engineering/technical elements of the photo optics for the detection are suitable. For the increase of the measuring accuracy picture-giving methods and further methods, which suggest the Eutergesundheitsstatus of the animal like milk temperature, can electric conductivity, milk river rate, ion concentrations (e.g. determined by ion-selective electrodes) in milk, concentration regulations of further milk contents materials such as Ketonkörper, Laktat, Laktatdehydrogenase, NAGase (e.g. by biosensors), for the optimization of the measuring accuracy to be determined supplemented.

[0045] The evaluation of the detection effected preferably by at least one image analysis program and/or at least one picture working on program, which are suitable/are/, by at least one algorithm in addition, which can be determined, which are suitable, by elements of the Fuzzy logic which can be determined to be supplemented and/and interconnected.

[0046] The measurement chamber of the device according to invention is in such a way trained that at least a portion of a liquid phase of the milk is derived from the measuring chamber, and that, by the control unit controllable valve mechanism is intended, by which in dependence by the result of a detection a wire for the usable milk or a wire for the not usable milk is released. Because the measurement chamber makes only the drain for the liquid phase possible, remains to flocs or particles within the measurement chamber. These flocs or particle can be detected by means of the detector unit. It becomes a relatively accurate result of the measuring of the particles and/or. Flocs obtains.

[0047] In order to guarantee that the liquid phase of the milk is only derived from the measuring chamber it will be held back, after a favourable embodiment of the device suggested that the measuring chamber exhibits retaining means, by the flocs and/or particles. An embodiment of the support means is preferential, with which the support means are formed by structures, in particular macro and/or microstructures. The macro and/or microstructures can be different mould or design. The structure can be also on a separate support within the measurement chamber arranged, which is more exchangeable.

[0048] For a reliable Rückhaltung of the particles and/or. Flocs it is suggested that the height of the structures up to 1 cm, preferably up to 0,8 cm, amounts to in particular 0.5 cm. Thereby a formation of the structure, whose height is equal to structures, is preferential. This is however not compellingly necessary. The structures can exhibit also different heights.

[0049] After a still further favourable embodiment of the apparatus it is suggested that the distance of the structures amounts to to each other up to 1 cm, preferably up to 0,8 cm, in particular 0.5 cm. The support means, in particular the structures, preferably the macro and/or microstructures are intended in the bottom portion of the measurement chamber.

[0050] In accordance with a favourable embodiment of the apparatus suggested that in the Milchleitung a flow guidance body is intended, by which a milk stream is hang-led to the measuring device. The formation of a flow guidance body of the situation-variable in the Milchleitung arranged is preferential is. The flow guidance body is movable thereby and can in the Milchleitung different positions take, so

'that the flow resistance can be different. It is preferably temporarly and into the Milchleitung at least partly importable.

[0051] In accordance with a further favourable embodiment of the apparatus it is suggested that between the Milchleitung and the measuring device a reservoir is intended. This reservoir can serve the current before the entrance of the milk of the measurement chamber for the calming.

[0052] After a still further favourable embodiment of the device it is suggested that downstream the terminal of the measuring device the Milchleitung is a buffer intended, which is connected with the Milchleitung, whereby after evaluation of the detection in dependence by the evaluation result milk from the buffer is led either into a wire for usable milk or into a wire for non-usable milk.

[0053] In accordance with a further favourable embodiment of the apparatus it is suggested that the measuring device is connected by a feed line with the Milchleitung and in the feed line a valve unit arranged. The milk stream in the Milchleitung can be led past by this measure the measuring device. If it concerns with the valve unit a multi-path unit, then this wire for a cleaning agent groups can be. It is guaranteed by an appropriate circuit of the valve unit that during a cleaning procedure no cleaning agent arrives into the Milchleitung.

[0054] The device is preferably in such a way trained that the measuring device exhibits an expiration mechanism, which has a movable catch body with an expiration edge, so that with a movement of the catch body the expiration edge accomplishes an essentially vertical change of position. A further training of the apparatus is preferential, with which the expiration mechanism is connected with the control unit, so that the course of motion of the catch body becomes controlled by the control unit.

[0055] After a still further favourable embodiment of the device it is suggested that in the measuring chamber the detector unit opposite area is intended, which is movable from horizontals. This has the advantage that in dependence of the angle of inclination way oversupplies a down-sunk particle is prevented. This can be achieved also by the fact that the measurement chamber is movable and/or the detector unit opposite area an essentially horizontal running axis. To the one it is reached by this favourable embodiment of the device that way oversupplies a held back particle is prevented and facilitated on the other hand the cleaning, if the measurement chamber is swivelled and/or the detector unit opposite area into an opposite direction.

[0056] In accordance with a still further favourable embodiment of the device it is suggested that the measuring chamber exhibits a detector unit opposite area and the detector unit and the area relatively to each other movable are. Thereby the distance between the detector unit and the opposite area for a detection can be changed.

[0057] Is preferably by a support, which is arranged at the measuring chamber soil, formed for the detector unit opposite area of the measurement chamber. Preferably the support is movable. This covers also that the cover can be changeable in its angle of inclination, so that the drain of an aqueous phase of the milk is facilitated and/or the Abschwemmen of the dropped particles is prevented. The moreover the support can be more rotary, in order to reach a complete detection.

[0058] The support is in such a manner trained that it is so structured in its surface finish that it is suitable, to obstruct down-sunk particles from a Abschwemmen to. Furthermore the attachment can exhibit a dark color impression or a bright color impression or in one geometrical arrangement of fields with a dark and a bright color impression, which can be determined, in order to make a contrast possible to the color impressions deposited particles.

[0059] After a still further favourable embodiment of the apparatus it is suggested that this exhibits a cleaning device. The cleaning arrangement preferably exhibits a wire for a cleaning agent. The measuring device is in the flow path of the cleaning agent arranged. In the area before and behind the measuring device in each case a valve unit is intended. These valve units are connected with the control unit, so that the measuring device is connected either with the Milchleitung or the wire for a cleaning agent or locked completely by all routings.

[0060] It is guaranteed by this favourable formation of the device that on the floor of the measuring chamber or on the support flocs and/or. Particles into the Milchleitung do not arrive. It is further guaranteed that the detection is disturbed by the measurement chamber not flowing through milk. The moreover a contamination of the milk-prominent wires becomes into a cleaning agent and/or. a cleaning fluid prevented and thus a physical separation between cleaning agent-prominent parts and the milk-prominent parts during a cleaning procedure reaches.

[0061] After a still further favourable formation of the device it is suggested that the device exhibits a blower mechanism, which is connected with the measuring device. An air flow is led by the blower mechanism by the measuring device. The blower mechanism can exhibit a heating mechanism, so that the air flow is led by the measuring device. The measuring device is separable in relation to the blower mechanism by a valve mechanism.

[0062] The measuring chamber of the apparatus according to invention is preferably in such a way trained that it is a component of a decanter. Thereby it is reached that without separate filter elements can be done, which are to be cleaned problematic. The moreover with simple means it is guaranteed that a reliable evaluation of the detection takes place, so that the diagnostic security is continued to increase.

[0063] After a still further favourable embodiment of the device suggested that a bypass line is intended, by those the milk stream is led alternatively into the measuring device or at least partly by the bypass line and by the one downstream the delta of the bypass line in the Milchleitung arranged valve mechanism controllable by the control unit, by which in dependence by the result of the detection a wire for the usable milk or a wire for the not usable milk is released.

[0064] The apparatus according to invention for the selection of milk exhibits a relatively simple constructional structure. It makes the determining for the negotiability possible of the milk to beginnings of a milking procedure, by detecting quality-determining particles. The determination of the particles takes place by means of the detector unit.

[0065] In order to arrange a deriving of the liquid phase from the measuring chamber more effective, it is suggested that the measuring device exhibits, in particular the measurement chamber additional means, which cause this. In particular that the device exhibits with the measuring device, in particular with the measuring chamber cooperating vibration mechanism, by the vibrations into the milk which is in the measuring chamber introduced will become suggested. Alternatively or additionally the measuring device can exhibit a separator or a rotary mechanism, which causes a separation of the liquid phase from the milk volume by centrifugal forces.

[0066] In accordance with a still further favourable embodiment of the apparatus it is suggested that the wall of the measurement chamber is trained at least partly hydrophob. So the wall with an appropriate coating layer can be trained. In similar way the coating layer with hydrophilic becomes and/or. lipophilic or lipophoben coating layers intended.

[0067] The surface of the support means, in particular the structure, preferably the macro and/or microstructures is trained at least partial, so that these fulfill a support function, by which the particles and flocs at the support means is held back.

[0068] In order to be able to use the apparatus for different uses, it is suggested that the support means, in particular the structures, preferably the macro and/or microstructures are more adjustable trained. Also a purposeful transmittance of the support means can be achieved by these, so that flocks and/or particles are only held back starting from a particular size.

[0069] The adjustable image of the support means simplifies also the purification process, since these can be removed preferably completely from the chamber, so that the wall of the measurement chamber can become simple and effective cleaned. The cleaning effect becomes also by the formation of the wall with the help of special coating layers or by purposeful vibration and/or. Movement increases.

[0070] Further details and features of the invention are described on the basis the embodiments represented in the design, without the item of the invention is limited to these preferential embodiments.

[0071] Show:

Fig. 1 schematically an apparatus for the selection of milk,
Fig. 2a - 2r Snapshots during an operation of the device after Fig. 1,
Fig. 3 schematically a second embodiment of an apparatus for the selection of milk,
Fig. 4a - 4m Snapshots during an operation of the device after figure 3,
Fig. 5 schematically a measuring device and a milk stream, as it flows through the measure,
Fig. 6 the measure after figure 5 in a sectional view,
Fig. 7 the measuring device with a cleaning agent,
Fig. 8 the measuring device after figure 7 in the cut,
Fig. 9 Support means in a front view and
Fig. 10 Support means in a plan view.

[0072] Fig. 1 points schematically a preferential embodiment of an apparatus to the selection of milk. The apparatus covers a Milchleitung 1. The Milchleitung 1 is connected by a feed line 18 of the measuring device 3.

[0073] Downstream the feed line 18 the Milchleitung 1 exhibits a valve mechanism 12, which becomes 10 controlled by a control unit. By the valve mechanism 12 the milk stream is not led in dependence by the result of a detection into a wire 13 for usable milk or into a wire 14 for usably milk.

[0074] Fig. 1 shows that in the Milchleitung 1 a flow guidance body is 2 arranged. In the transition area between the Milchleitung 1 and the feed line 18 a reservoir 22 is intended.

[0075] In the represented embodiment the flow guidance body 2 projects radially inward from a wall of the Milchleitung 1 these partial into the reservoir 22. In the represented embodiment the flow guidance body 2 at the Milchleitung arranged is stationary. Alternatively the flow guidance body can be trained 2 movable. It can be into the Milchleitung 1 in and executable. This can be connected by an appropriate actuator with the control unit 10, so that the flow guidance body 2 in dependence of the procedure conditions changes the ply. Preferably the flow guidance body 2 is in such a way trained that it offers 1 flowing milk a different flow resistance in dependence of its ply of the Milchleitung.

[0076] Between the reservoir 22 and the measuring device 3 a valve unit 17 is intended. In the represented embodiment the valve unit 17 signal lines over not represented is connected with the control unit 10.

[0077] The measuring device 3 exhibits a measurement chamber 4, which is connected with the feed line 18. The measuring device 3 exhibits a detector unit 6. With the detector unit 6 it concerns in the represented embodiment an optical detector unit. Beside the detector unit 6 lighting units 7 are represented.

[0078] The measuring device 3 exhibits preferably at least one filling condition sensor, 9. In the represented embodiment two filling condition sensors 8, 9 are intended. The filling condition sensors 8, 9 are connected signal lines over not represented with the control unit 10. The filling condition sensor 9 detects the highest filling conditions in the chamber 4. The filling condition sensor 8 detects the lowest filling conditions in the measurement chamber 4. The measuring chamber 4 is a component of a decanter.

[0079] The measuring device 3 exhibits an expiration mechanism 11, in the milk from the measurement chamber 4 to run off can. The expiration mechanism 11 exhibits a movable catch body 23 with an expiration edge 24. The catch body 23 is movable trained, so that the expiration edge 24 accomplishes an essentially vertical change of position. The equipment 11 is connected with the control unit 10.

[0080] In the represented embodiment a support is 5 arranged on floors 25 of the measurement chamber 4. The support 5 is essentially evenly and horizontal positioned. The floor 25 of the measurement chamber is hang-bent for expiration execution 11. The support 5 partly covers the floor 25. It is positioned opposite-putting the detector unit 6.

[0081] Fig. an output configuration of the apparatus points 2 to the selection of milk.

[0082] In this output constellation the valve mechanism is 12 closed, so that a fluid-technical connection between the Milchleitung 1 and the wire for non-usable milk is interrupted opened and the connection between the Milchleitung 1 and the wire 13 for usable milk.

[0083] The valve unit 17 releases the feed line 18, so to milk from the Milchleitung the 1 over the feed line 18 at the measuring device 3 to arrive can, as this is schematically in the figure 2a represented. The milk anflutende in the Milchleitung 1 is derived by the flow guidance body 2 into the reservoir 22 and from there out into the wire 18.

[0084] The filling conditions within the measurement chamber 4 are detected by the filling condition sensors 8, 9. If the filling condition sensor 8 detected minimum filling conditions, this filling condition sensor sends a signal A to the control unit 10, as this is in the figure 2C schematically illustrated. By the control unit 10 over a signal B the valve unit 17 is headed for. It causes a shutter, so that the milk stream no more into the feed line 18 arrive can, but far into the Milchleitung 1 is led. The milk flows over the wire 14 for non-usable milk and is rejected.

[0085] The volume of the measurement chamber 4 is preferably so limited that the measuring chamber can also take up itself after actuation of the valve unit 17 18 milk volumes finding in the valve unit 17 and the feed line.

[0086] Fig. 2d shows that the milk stream of the first Gemelksfraktion filled the measurement chamber 4 completely and from the filling condition sensor 9, which recognizes the maximum filling conditions a signal C to the control unit 10 sends. By a signal D the control unit 10 heads for the expiration mechanism 11.

[0087] Becomes the catch body 23, with which it concerns a cylindric catch body, which has an opening 26, headed for. The catch body 23 is rotated against the clockwise direction, so that the opening 26 into a flowtechnical connection with the measurement chamber 4 arrives. The aqueous phase of the milk parliamentary group caught in the measuring chamber 4 flows thereby over the expiration edge 24 into an expiration 19. This is represented in figures 2e and 2f. The expiration 19 is only schematically illustrated ones.

[0088] The decanting of the milk from the measurement chamber 4 leads to a decrease of the fluid level in the measurement chamber 4. This is detected by the filling condition sensor 9. The sensor 9 sends a signal E into the control unit 10 (Fig. 2g). The control unit 10 activates the lighting unit 7 and the detector unit 6 by the signals F and G.

[0089] The lighting unit 7, which can contain several shining means, lights up the support of the measuring chamber soil 25 with the particles dropped to it 21, while the detector unit 6 the surface of the support 5 with the particles present at it 21 detects itself.

[0090] The information from the detection as signal H1 to the control unit 10 are led, which does not change the valve position of the valve mechanism 12 due to the detected quality-determining particles 21 (c1), so that as quality-reduced milk stream further into the conduit the 14 for non-usable milk one exhausts.

[0091] With the signal J the control unit 10 heads for a valve unit 16 of a cleaning device 20. A cleaning agent flows out of a line 15 for a cleaning agent into the measuring device 3, as it is in the figure 2j schematically illustrated.

[0092] During the milking procedure, with which a milk stream by the Milchleitung 1 flows, as in the figure 2C schematically illustrated, the measuring device 3 by a cleaning agent from the line 15 for a cleaning agent is flowed through and the particles 21 is replaced and delivered. The cleaning procedure is recognized by the level of liquid sensor 9 for the maximum filling conditions. The level of liquid sensor 9 sends a signal L to the control unit 10, which thereupon the valve unit 16 by a signal M arranges to terminate by sealing of the wire for a cleaning agent the cleaning procedure.

[0093] The entire cleaning agent flows off over the expiration 19. If necessary the not represented equipment a feed takes place from air to the measuring device 3.

[0094] By the level of liquid sensor 8 the completion of the cleaning procedure is announced over the signal N to the control unit 10, thereupon by the signals Q and P to at least a lighting unit 7 and the detector unit 6 activate. The detector unit 6 examines cleaning success. The detector unit 6 supplies a signal Q, as in the figure 2n suggested, to the control unit. This signal Q is evaluated and specified whether the cleaning procedure is to be repeated or, as in figure 2n represented, successful was and therefore the expiration mechanism 11 over the signal R into the starting position be brought can.

[0095] An end of the milking procedure is conveyed to the control unit 10 a signal S that for the example by a milk river recognition, which is not represented it can be sent. Due to the detection by flocs now the Milchleitung 1 before the next milking procedure is to be cleaned. The control unit 10D sends a signal T to a cleaning device for the Milchleitung, e.g. an intermediate flushing 20, so that the Milchleitung 1 can be released from quality-reducing particles, as this is represented in the figures 2o and 2p.

[0096] After the cleaning of the Milchleitung the entire system is available in the further event.

[0097] The figure 2q shows the snapshot of a detection of the surface of the support 5 by the detector unit 6. The detector unit 6 supplies a signal H2 to the control unit 10. The information content of the signal H2 promises the information that no flocs and/or. Particles detected are. Over the signal K2 thereupon the valve mechanism 12 arranges to lock the wire for the non-usable milk and to open the wire 13 for usable milk, so that as qualitatively perfect recognized milk into the milk collection tank can be led, as this is schematically in the figure 2r represented.

[0098] Fig. schematically a further preferential embodiment of an apparatus points 3 to the selection of milk. The apparatus exhibits a Milchleitung 101. In der Milchleitung 101 sind ein Milchflusssensor 102 und eine Messeinrichtung 103 angeordnet, so dass diese für einen Milchstrom durchströmbar ist. The measuring device 103 exhibits a measurement chamber 104, is 105 arranged in which at least a filter. The moreover the measuring device 103 exhibits a detector unit 106, which is only suggested in the figure 3. With the reference numeral 107 is a control unit designated, which covers also a computer. The control unit 107 is connected with the milk river sensor 102 and with the detector unit 106.

[0099] Parallel to the direction of flow of the milk a bypass line 108 is intended, so that the milk stream can be led alternatively by the measuring device 103 or by the bypass line 108. The bypass line 108 flows downstream into the Milchleitung 101. Downstream the delta of the bypass line 108 in the Milchleitung 101 a valve mechanism 109 is intended, which becomes 107 controlled by the control unit. By the valve mechanism 109 the milk stream is led either into a wire 111 for the negotiable milk or into a wire 110 for the non-negotiable milk.

[0100] Above the measuring device 103 a valve 115 is intended in the Milchleitung 101. With the valve 115 it concerns a multiple way valve. The valve 115 is connected with the control unit 107, which is connected with the milk river sensor 102 for its part.

[0101] The milk flowing in in the Milchleitung 101 flows through the milk river sensor 102, which sends a signal to the control unit 107. The control unit 107 sends a signal with recognized milk river to the valve 115, which locks preferably time-delayed the feed line to the measuring device 103 and opens the simultaneous bypass line 108 for the milk stream, so that the milk stream is led by the bypass line 108 into the Milchleitung 101.

[0102] The moreover a valve 118 is intended, which is likewise with the control unit 107 connected, changes at the same time with the valve 115 to the maintenance of vacuum conditions its position and the feed of the milk stream by the bypass line with simultaneous termination of the derivative from the measuring device 103 ensures 108 into the Milchleitung 101.

[0103] The figures 5 to 8 show items of the measuring device 103. The measuring device 103 exhibits a measurement chamber 104, into which a filter 105 is integrated. Before the measurement chamber 104 is an inlet 116. Behind the measurement chamber 104 is an expiration 117.

[0104] The measuring device 103 exhibits a further detector unit 106. It covers a transmitter 119 and a receiver 120 in dependence of the measurement principle to the detection of the particles 121 which are on the filter element. With measurement principles, which are based on the measuring of reflectances, the receiver can become or be void 120 with the transmitter 119 combined. For measurement principles, which are based on the measuring of transmissions and/or absorbances, the arrangement becomes as in Fig. 6 and 8 represented preferred.

[0105] Fig. 4a shows a starting situation for the selection of milk. By a signal A, with which it concerns a signal of the milk river sensor 102, the control unit 107 is headed for. The control unit 107 receives here a signal, to milk in the Milchleitung 101 to the measuring device 103 flows.

[0106] The control unit 107 steers the valve 115 and by an outgoing signal C the valve 118 by an outgoing signal B on (Fig. 4b), so that the milk stream does not flow through any more after change of the valve positions the measuring device 103, but the bypass line 108.

[0107] Preferably the control unit heads for 107 time-delayed with the signal D the detector unit 106 of the measuring device 103, then the surface filter 105 and possibly existing flocs and/or. Particle 121 detects (Fig. 4c).

[0108] The detector unit 106 sends a signal E after detection to the control unit 107 (Fig. 4d). The control unit 107 does not change the valve position of the valve mechanism 109 by a signal F due to the positive finding, so that as negotiably not detected milk invariably by the wire for not usable milk the 110 flows off (Fig. 4d).

[0109] The control unit 107 steers the valves 114 and 113 of the cleaning device on by the outgoing signals G and H (Fig. 4d), so that

these the supply of cleaning agent and/or. - liquid preferably with positive pressure from the wire for cleaning agent 112 permits.

[0110] The cleaning agent flows against the milk river direction by the expiration 117, the measurement chamber 104, the filter 105, the supply 117 under detachment and taking along of the flocs and/or. Particles 121 and existing remainder milk by the valve unit 114 (Fig. 4e and Fig. 8).

[0111] Preferably time-controlled is sent to expiration of a defined time interval by the control unit 107 a signal J to the valve unit 113, those by change of the valve position the inflow of cleaning agent ended (Fig. 4e). Meanwhile the valve unit remains 114 in unchanged valve position, so that residual water can flow off in the inlet 117 by the opened valve 114 (Fig. 4e/4f).

[0112] The control unit 107 sends preferably time-delayed a signal K to the detector unit 106, which examines cleaning success then (Fig. 4e). Over the signal L the status of cleaning success is sent by the detector unit 106 to the control unit 107. In dependence of the cleaning status the cleaning procedure can be repeated (Fig. 4f). With completion of the successful cleaning procedure is the detection of floccules and/or. Particles ended, while the cow is further milked.

[0113] The milking becomes by a removing and/or. missing milk river in the Milchleitung 101 introduced and by the milk river sensor 102 determined, which sends a signal M to the control unit 107. The control unit 107 sends thereupon to the valve units 114 a signal N, 115 a signal O and 118 a signal P, which changes its valve positions (Fig. 4g). Due to the change of position of valve 118 can be led by the cleaning procedure in the expiration of 117 remaining residual waters by the remainder vacuum from the line system into the wire for not usable milk 110 (Fig. 4h). With the reaching of the starting positions in all valve units the system for the next milking procedure is ready (Fig. 4h).

[0114] The following Fig. 4i to 4m show the sequence already for a eutergesunde cow, those in the Fig. 4a to 4h for a clinical euterkranke cow was described. The procedure guidance, like it in the Fig. 4a to 4c represented and described is, corresponds to the representation in the Fig. 4i to 4k.

[0115] The detector unit 106 sends in Fig. 41 due to the negative finding (no flocks and/or. Particle) a signal Q to the control unit 107. The control unit 107 sends a signal R to the valve unit 109, which locks the wire for not usable milk 110 by change of the valve position and which wire for usable milk 111 releases, so that the milk from the Milchleitung 101 flows into the milk collection container (Fig. 4m).

[0116] A cleaning course can preferably be void, since the milk is not sense-due changed. The milk remainder remained in the expiration 117 is derived with next, following milking.

[0117] Figure 9 shows schematically the formation of support means 30. The support means 30 are for example trained on a support 5, which forms the floor of the measurement chamber 4. The support means 30 are trained in the represented embodiment in the form of macro structures 31 and microstructures 32.

[0118] In the represented embodiment the macro structures 31 and the microstructures 32 are essentially cylindric trained. The macro structures 31 can exhibit also different moulds. The height of H of the structures can likewise vary. The arrangement of the micro and of the macro structures of the support 5 can correspond to a distribution. Also distributions of the macro and microstructures can be made, which are dependent on the direction of flow of the milk in the measurement chamber.

Reference symbol list

1 Milchleitung
2 Flow guidance body
3 Measuring device
4 Measurement chamber
5 Support
6 Detector unit
7 Lighting unit
8 Filling condition sensor
9 Filling condition sensor
10 Control unit
11 Expiration mechanism
12 Ventileinrichtung
13 Wire for usable milk
14 Leitung für nicht-verwertbare Milch
15 Wire for a cleaning agent
16 Valve unit
17 Valve unit
18 Feed line
19 Ablauf
20 Cleaning device
21 Flocs and/or. Particle
22 Reservoir
23 Catch body
24 Expiration edge
25 Floor
26 Opening
30 Support means
31 Macro structure
32 Microstructure
101 Milchleitung
102 Milk river sensor
103 Measuring device
104 Measurement chamber
105 Filter
106 Detector unit
107 Control unit
108 Bypass line
109 Valve mechanism
110 Wire for non-usable milk

111 Wire for usable milk
112 Wire for a cleaning agent
113 Valve unit
114 Valve unit
115 Valve
116 Inlet
117 Expiration
118 Valve
119 Transmitter
120 Receiver
121 Flocs and/or. Particle

Result Page

1. Method for the selection of milk, with that
a milk volume of a milk stream into a measurement chamber (4, 104) with at least a detector unit (6, 106) is led,
at least a part of the liquid phase of the milk finding in the measurement chamber (4, 104) leads away itself from the measurement chamber (4, 104) and to it
a detection at least an area of a bottom surface (25) of the measurement chamber (4; 104) taken place,
whereby an evaluation of the detection takes place and in dependence from the evaluation result the milk stream either to the collection container for usable milk is led or rejected.

2. Process according to claim 1, with which the milk volume is also brought to permeable support means (30) for the liquid phase in contact.

3. Process according to claim 2, with which the support means (30) are formed by macro and/or microstructures (31, 32), between which at least a portion of the liquid phase is derived.

4. Process according to claim 2 or 3, with that is derived the liquid phase within a given time interval from the measurement chamber (4, 104).

5. Method for the selection of milk, in particular according to claim one of the claims 1 to 4, with that
a milk volume of a milk stream into a measurement chamber (4, 104) with at least a detector unit (6, 106) is led,
a decanting at least a part itself of the milk and thereafter, finding in the measurement chamber (4, 104)
a detection at least an area of a bottom surface (25) of the measurement chamber (4, 104) takes place,
whereby an evaluation of the detection takes place and in dependence from the evaluation result the milk stream either to the collection container for usable milk is led or rejected.

6. Process according to one of claims 1 to 5, with that the milk stream, after introduction of the milk volume, at which measurement chamber (4, 104) is led past.

7. Process according to claim 6, with which the milk stream in a bypass line (108) at the measurement chamber (104) is led past.

8. Process according to one of claims 1 to 7, with before each detection at least the measuring chamber (4, 104) in relation to a milk stream finally and cleaned becomes if necessary.

9. Process according to one of claims 1 to 8, with that the milk stream in a Milchleitung (1, 101) is led, those by a feed line (18, 116) with by the measurement chamber (4, 104) is connected, whereby in the feed line (18, 116) a valve unit (17, 117) is arranged is interrupted, by some the flowtechnical connection between the Milchleitung (1, 101) and the measurement chamber (4, 104).

10. Process according to one of claims 1 to 9, with that is led the milk stream into a buffer and led after evaluation of the detection in dependence by the evaluation result from the buffer either into a wire (13, 111) for usable milk or into a wire (14, 110) for non-usable milk.

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11. Process according to one of claims 1 to 9, with which the milk stream is rejected during the detection.

12. Process according to one of claims 1 to 11, with that is calmed down the milk stream before the measurement chamber (4, 104) in a calming distance.

13. Process according to one of claims 1 to 12, with which a distance and/or the ply between the bottom surface (25) of the measurement chamber (4) and an expiration edge (24) of a drain port (26) are relatively to each other changeable.

14. Process according to one of claims 1 to 13, with after detection and after an emptying of the measurement chamber (4, 104) a cleaning procedure of the measurement chamber (4, 104) is preferably accomplished.

15. Process according to claim 14, with which during the cleaning procedure at least a cleaning agent is led by the measurement chamber (4, 104).

16. Process according to claim 15, with which after that at least a cleaning agent air is passed through the measurement chamber (4, 104).

17. Process according to claim 16, with which air is essentially free from macroscopic particles.

18. Process according to claim 16 or 17, with that is passed through warmed up air the measurement chamber (4, 104).

19. Process according to one of claims 14 to 18, with a cleaning agent opposite to the direction of flow of the milk stream that at least a filter (105) flows through at least.

20. In each case process according to one of claims 14 to 19, with before and after the measuring chamber (104) a valve mechanism (113, 114) is intended, which and the derivative of the cleaning agent from a conduit (112) for cleaning agents made possible and which become by a control unit (107) controlled.

21. In each case process according to one of claims 1 to 20, with before and after the measurement chamber (104) a valve mechanism (115, 118) is intended, which the measurement chamber (104) of the Milchleitung (101) and which locks becomes by a control unit (107) controlled.

22. Process according to one of claims 1 to 21, with that before the measurement chamber (104) a milk river recognition takes place.

23. Process according to one of claims 14 to 22, with that is examined the cleaning success of the measuring chamber (4, 104) by detection and in dependence by the evaluation result the cleaning to be repeated can.

24. Process according to one of claims 1 to 23, with that the detection optically takes place.

25. Process according to one of claims 1 to 24 with the evaluation of the detection by at least one image analysis program or/and at least one picture working on program and/or at least one image processing program taken place, which is suitable/is/, by at least one algorithm in addition, which can be determined which is suitable, by elements of the Fuzzy logic which can be determined to be supplemented and/or interconnected.

26. Apparatus for the selection of milk also
a Milchleitung (1, 101),
one with the Milchleitung (1, 101) connected measuring device (3, 103), the one measurement chamber (4, 104) with at least a detector unit (6, 106) exhibits and with a control unit (10, 107), which is connected with the detector unit (6, 106),
characterised in that
the measurement chamber (4, 104) is so trained that at least a part of a liquid phase of the milk is derived from the measurement chamber (4), and that one, by the control unit (10, is planned 107) controllable valve mechanism (12, 109), by in dependence by the result of a detection a wire (13, 111) for the usable milk or a wire (14, 110) for the non-usable milk released.

27. Device according to claim 26, characterised in that, which exhibits measurement chamber (4, 104) support means (30).

28. Device according to claim 27, characterised in that the support means (30) by structures, in particular macro and/or microstructures (31, 32) are formed.

29. Device according to claim 28, characterised in that the height (H) of the structures (31, 32) up to the 1 cm, preferably up to 0,8 cm, in particular 0.5 cm, amounts to.

30. Device according to claim 28 or 29, characterised in that the distance (A) of the structures (31, 32) to each other up to the 1 cm, preferably up to 0,8 cm, in particular 0.5 cm, amounts to.

31. Apparatus after one of the claims 27 to 30, characterised in that the support means (30) in the bottom portion of the measurement chamber (4, 104) are intended.

32. Device after one of the claims 26 to 31, characterised in that a flow guidance body (2) in the Milchleitung (1) is intended, by which a milk stream is led to the measuring device (3).

33. Device according to claim 32, characterised in that of the flow guidance bodies (2) situation-variable in the Milchleitung (1) arranged is.

34. Device after one of the claims 26 to 33, characterised in that between the Milchleitung (1) and the measuring device (3) a reservoir (22) is intended.

35. Device after one of the claims 26 to 34, characterised in that downstream the measuring device (3, 103) a buffer is intended, that with the Milchleitung (1, 101) is connected, whereby after evaluation of the detection in dependence by the evaluation result milk from the buffer is led either into a wire (13, 111) for usable milk or into a wire (14, 110) for non-usable milk.

36. Device after one of the claims 26 to 35, characterised in that the measuring device (3) connected by a feed line (18) with the Milchleitung (1) and in the feed line (18) a valve unit (17) arranged is.

37. Device after one of the claims 26 to 36, characterised in that the measuring device (3) an expiration mechanism (11) exhibits, which has a movable catch body (23) with an expiration edge (24), so that with a movement of the catch body (23) the expiration edge (24) accomplishes an essentially vertical change of position.

38. Device according to claim 37, characterised in that the expiration mechanism (11) with the control unit (10) is connected.

39. Apparatus after one of the claims 26 to 38, characterised in that in the measuring chamber (3) one the detector unit (4) opposite area exhibits, which is expenditure-guided from horizontals.

40. Apparatus after one of the claims 26 to 39, characterised in that the measurement chamber (4) and/or the detector unit (6) opposite area around an essentially horizontal running axis is movable.

41. Device after one of the claims 26 to 40, characterised in that the measurement chamber (4) one the detector unit (6) opposite area exhibits and the detector unit (6) and the area movable are relatively to each other.

42. Device according to claim 39, 40 or 41, characterised in that the detector unit (6) opposite area by a support (5) is formed.

43. Apparatus after one of the claims 26 to 42, characterised in that this a cleaning device exhibits.

44. Apparatus according to claim 43, characterised in that a conduit (15, 112) for a cleaning agent is intended, those with the feed line (18) and/or. with the expiration (117) is connected.

45. Device after one of the claims 26 to 44, characterised in that the measuring chamber (6) a component of a decanter is.

46. Device after one of the claims 26 to 45 characterized by a bypass line (108); so that the milk stream is led alternatively by the measuring device (103) or at least partly by the bypass line (108) and by one downstream the delta of the bypass line (108) in the Milchleitung (111) arranged valve mechanism (109), controllable by the control unit (107), by which in dependence by the result of the detection a wire (111) for the usable milk or a wire (110) for the not usable milk is released.

47. Device after one of the claims 26 to 46, characterised in that this one with the measuring device (3, 103), in particular with the measurement chamber (4, 104) cooperating vibration mechanism exhibits.

48. Device after one of the claims 26 to 47, characterised in that the measuring device (3, 103) a separator exhibits.

49. Apparatus after one of the claims 26 to 48, characterised in that the wall of the measurement chamber (4, 104) is at least partly hydrophob trained.

50. Apparatus after one of the claims 27 to 49, characterised in that the surface of the support means (is 30) at least partly responsible trained.

51. Apparatus after one of the claims 27 to 50, characterised in that the support means (30), in particular the structures, preferably the macro and/or microstructures (31, 32) are more adjustable trained.